

CoCo Keyboard Extender Cable -- Marty Goodman, designer**Product Description:**

This product is designed to greatly simplify the task of hooking a remote keyboard to most models of Color Computer. It is designed to assist do-it-yourselfers who are not afraid to open up their Color Computer's case. The installation of the cable requires no soldering if one does not want to make use of the provisions for remote reset button and power on lights. If one wants to take advantage of those provisions, soldering of a total of about a dozen connections is required on the adaptor boards and the CoCo mother board itself.

The cable will work with all models of CoCo 2 and 3, and with CoCo 1 "F" (also known as "NC") board computers. It is NOT designed to work with the very old CoCo 1 Rev D and Rev E type boards, because those use a different type of keyboard connector on their mother board.

The product consists of 5.5 to 9 feet of ribbon cable and two specially constructed adaptor boards which the cable connects to at each end. Also included are some pieces of double sided sticky tape for attaching the remote keyboard adaptor board to the back of that keyboard.

This product does NOT include a spare CoCo keyboard, nor does it include a case for the remote keyboard, nor does it include a remote reset switch or power on light. The cable may be used with your existing keyboard, although you will have to cover the big hole remaining in the CoCo's case when the keyboard is removed. Bob Rosen of Spectrum Projects is selling CoCo 2 Keyboards for \$20, and CoCo 3 keyboards may be purchased from Spectrum Projects. Although a spare keyboard is not provided, the keyboard cable system allows you to keep your existing keyboard still installed and working, and at the same time have a remote keyboard also attached.

Some Background

I've been using lap keyboards on all my Color Computers for the last four years. This allows me to put most of the clutter of my CoCo systems (Mother Box, Multipak, assorted plug in cards, etc.) off above, below, or to one side of my main work space, leaving the keyboard on my lap (or on the desk) and the disk drives within reach, and the monitor within view. It makes for a much cleaner work space. Although in theory one might expect that extending the PIA keyboard lines out a distance of six to ten feet might cause problems, in practice no such problems have ever been encountered.

In making those remote keyboards for myself and a few friends, I quickly discovered that by far the hardest part of the job was arranging for the connection between the cable and the CoCo, and (at the other end) between the cable and the remote keyboard. This was due to the odd ball connector used on the CoCo mother board for the keyboard, and by the difficult-to-work-with mylar ribbon used on the CoCo keyboard itself. My early efforts involved tedious desoldering of the CoCo mother board connector, and tedious construction of adaptors using difficult-to-get flat mylar ribbon sockets.

It occurred to me that if I could make up (using custom printed circuit boards and proper sockets) a solderless means of hooking the remote keyboard up, solving the most tricky problem, many tinkerers who otherwise might not be able to make up their own remote CoCo keyboard would now be able to do so.

Installation

Please read this entire set of instructions before attempting to install this cable. Failure to do so may cause problems! If after reading these instructions you feel this product is not for you, please return it to whoever sold it to you for a full refund. Again, I emphasize: This cable is a tool designed to greatly aid folk who already are to some extent or other tinkerers. It is NOT for those who are unable to do minor tinkering with the innards of their computer.

The installation consists of opening up your color computer, disconnecting the existing keyboard from the mother board, then either inserting the cable between the keyboard and the connector on the mother board, OR installing the cable inside the CoCo in such a fashion that the existing keyboard is again connected via a spare connector provided on the cable adaptor board. One would be doing the latter if one had a second keyboard one wanted to use as a remote keyboard, and wanted to leave inside the CoCo the existing keyboard.

Note that the cable is supplied with the adaptor boards attached. But these two adaptor boards may be easily separated from the cable. The cable attaches to the adaptor boards via 20 pin female connectors at each end. Note also that the side of the cable with the black or red stripe on it should be on the same side of the adaptor board that has the tiny numeral "1" at one edge near the edge connector traces. In either case, the most important aspect of a successful installation will consist of properly anchoring the keyboard cable inside the CoCo case, suitably relieving strain that might be caused if that cable were tugged. More on this later.

If you plan on making use of the provisions for remote reset and/or power on light, be sure to solder the needed wires to the adaptor boards BEFORE doing the installation detailed below. Tips on doing that will be found toward the end of this documentation.

Preliminary Work:

The CoCo's case is held together by six screws on its under side. One of these six screws may be covered by a warranty sticker. To proceed beyond this point you must either break that warranty sticker, or carefully remove it using liberal drenchings with lighter fluid and gentle teasing with an Exacto knife and firm but gentle tugging on one edge. Remove all six screws and open up the computer. .

Now you must disconnect and remove the existing CoCo keyboard. Hold the mylar cable firmly at both edges near where it connects to the CoCo mother board. Now pull up on it gently but firmly. If your keyboard is NOT connected to your CoCo mother board by a transparent mylar cable, your CoCo is probably an old D or E board CoCo, and this cable cannot be easily used with it.

Is Your Keyboard Suitable?

Note that on some very early CoCo 2 "low profile" keyboards, the mylar cable did not come out from the top of the keyboard, but rather from the bottom. Or, in some of these early keyboards, the traces were placed on the other side of the mylar cable from the side used in most later editions. These early model keyboards will NOT work properly with either the motherboard or the remote keyboard side of the adaptor. For a keyboard to work with this cable, the mylar cable must come out of it at the top of the keyboard, and must have traces on the same side of the cable that the keys are on if the cable is simply extended straight out from the keyboard. You may need to order another keyboard if you have one of the very early "low profile" CoCo 1 or 2 keyboards. I must admit it MAY be possible for the creative tinkerer to adapt this system for use with HJL and low profile keyboards. But you are on your own should you try this.

CoCo MOTHERBOARD Side of the Installation:

The adaptor board that plugs into the CoCo is the one that has the 16 contact edge connector exposed and ready to insert into the CoCo Motherboard keyboard socket. The other adaptor board (the one for the remote keyboard end of the cable) has the CoCo mylar keyboard socket lying on the board in such a way that it would prevent plugging that board into the keyboard socket on the CoCo mother board. Note that BOTH the mother board and the remote keyboard adaptors have sockets for inserting a mylar keyboard cable from a CoCo keyboard. The function of the socket on the motherboard side of the cable is to allow you to hook both the existing keyboard and the cable to the CoCo at the site of the main CoCo box.

If you have two CoCo keyboards, do the following: Locate, as per instructions in the above paragraph, the motherboard adaptor board. Disconnect the long keyboard cable from the adaptor board at that side. Now, insert the mylar keyboard cable from the keyboard you just disconnected into the keyboard cable socket that accommodates it on the adaptor board. Be sure this is done with the raised black traces on the keyboard cable contacting the metal contacts on the socket. The cable must be very firmly and completely inserted into the socket, and each black trace must be fully lined up with the metal contacts.

Now, insert the adaptor board into the keyboard cable socket on the mother board. Note carefully that it must be inserted with the tinned edges facing toward the rear of the Color Computer, and the connectors for the internal keyboard and for the long ribbon cable facing toward the front of the CoCo. You will now have the CoCo and its keyboard again attached, but now via that adaptor board. At this point you should turn on the computer and test to make sure your existing keyboard is working properly. If it is not, carefully recheck your work for any problems.

If all is well, now look at the dual row of 20 pins sticking out of the adaptor board and facing the front of the CoCo. It is to this row of pins that you then must re-attach the main long ribbon cable. Do so in a fashion that keeps the black or red side of the long cable on the same side as keyboard connector pin number 1. You will also have to carefully bend and fold the long cable so as to lead it away from that area without its interfering with the mylar keyboard cable that is plugged in below it. I leave this to your imagination. After the long cable is attached, again check to make sure the internal keyboard is working properly. If attachment of the main cable causes a previously working adaptor board to malfunction, there may be a problem in the cable.

If you are going to use the existing keyboard inside your CoCo as the remote board, then you can ignore the part about attaching it back up via that extra socket on the motherboard adaptor board. Just completely remove the keyboard, and insert the adaptor board with cable. Again, be sure the tinned contacts are facing to the rear of the computer as you insert the board into the keyboard cable socket on the main CoCo mother board.

In either case, it will now be up to you to carefully and solidly anchor the cable coming out of the CoCo. Wire ties, double sided sticky tape, and the like, can all be used. You will also have to file down an area thru which to pass the cable out of the CoCo when the case is again closed up. Note that the height of the adaptor board that plugs into the main CoCo board has been VERY carefully chosen so that, when you close the CoCo case, it will resist being pulled forward, for it will bump into part of the top of the case when pulled forward. But do not completely rely on this partial strain relief! Be sure that cable is solidly anchored to the inside of your CoCo box.

If you have removed the keyboard from the CoCo, you may want to cover the enormous hole left by its removal. This can be done with a piece of plastic, or even with a piece of corrugated cardboard. One can just tape such a piece of material to the inside of the top cover of the CoCo case, to achieve a somewhat more cosmetic appearance.

REMOTE Keyboard Side of the Installation:

Turn your CoCo keyboard upside down, so that its keys are flat against the table. Gently bend the mylar cable coming out of its top so that it is folded over and lying against the back of the keyboard. Be VERY careful to NOT bend it sharply, and to NOT crease it, for this may damage the irreparable and delicate contacts on the cable. At this point the conductive traces on the cable should be exposed and facing you.

Now locate the remote keyboard adaptor board. This is the one that has the keyboard socket bent flat against the little board, and the cable extending out in the other direction. You may wish to temporarily disconnect the little adaptor board from the cable, as you may have done when installing the cable at the CoCo motherboard end. Place the little printed circuit board with the socket for the mylar cable against the back of the keyboard. If you are using the provisions for remote reset or power on light, be sure the needed wires have already been soldered to that adaptor board. You should attach to the solder side of that little adaptor board TWO layers of double sided foam sticky tape. Some of this tape is provided. You can also buy more of this tape at Radio Shack or at most hardware stores.

Be sure the metal contacts of the socket on the adaptor board are on the SAME SIDE as the exposed conductive traces of the keyboard's mylar ribbon. Now gently but firmly insert the mylar ribbon into the keyboard cable socket of the adaptor board. If all is well, the keyboard cable, when folded over as described, and the adaptor board, when layed flat against the back of the keyboard with its solder (now double sided sticky taped) side against the back of the keyboard, will mate properly, with the conductors correctly engaged.

Before using the double sided sticky tape to attach the little adaptor board to the back of the keyboard, test out your remote keyboard. It should work properly. If not, carefully re check your work. Make sure that the cable is plugged in correctly at both adaptor boards.

Note that it is possible to use the CoCo keyboard by itself without a case. If you elect to do this, you should carefully protect the exposed part of the mylar ribbon cable and the adaptor board. I would recommend first covering the mylar ribbon cable where it is exposed with frosty "magic" tape. I'd then cover the entire mess in some way, to prevent harm coming to the cable or the adaptor board. I would also be careful to properly attach and anchor the cable as it leaves the keyboard on its way to the main CoCo.

Those with a little ingenuity at making cabinets can construct their own remote keyboard case. Another alternative is to buy from Tandy National Parts a plastic shell for a CoCo 2 or 3, and use that as the basis of your remote keyboard case. You may either use that intact, or elect to hack saw it down to make it a little smaller front to back.

Remote Reset and Power On:

If you are not afraid to do a little soldering, you can impliment a remote reset and/or power on light in the cabinet of your remote keyboard. Note that the cable used is 20 conductor, of which only 16 correspond to keyboard cable pins. Note too that keyboard cable pin 3 is not connected anyway. Thus we have four or five extra lines on the cable, that can be used as you might see fit. Four of those lines I have hooked to solder pads on the adaptor boards, and I have labelled three of those pads "G", "R", and "5". This was meant to correspond to "Ground", "Reset", and "+5 Volts".

The reset line can usually be picked up from the reset switch itself on the CoCo. On many CoCo 2's and 3's the two metal contacts at the top of the reset switch provide both ground and an active reset line. Merely attach those contacts to the "G" and the "R" pads on the CoCo motherboard adaptor, then hook a momentary contact switch to the "G" and "R" pads of the remote keyboard adaptor board, and mount that in your remote keyboard case. Similarly, if you wish, you can pick off a source of +5 vols from somewhere on your CoCo mother board (there are about a hundred good places to do that). Running that to the "5" pad, you can at the keyboard side use that and ground to light up a little LED via a 1K resistor. This can serve as a remote power on light. If you don't know where to find +5 volts on your CoCo motherboard or if you can't figure out for yourself which of the contacts on the CoCo reset switch is ground and which is the reset line, you should not be trying to take advantage of this option. Abandon the idea, or get a competent tinkerer to help you.

Heavy duty hackers will undoubtedly find SOME use for the remaining two unlabelled but unused lines on the cable.

I EMPHASIZE that this keyboard cable system is meant as a helping hand for tinkerers, and is NOT for novices who are unable or unwilling to tinker a bit with the innards of their Color Computer. But those who ARE comfortable installing this item will, I am reasonably sure, be very pleased with the immense added flexibility and utility it gives your Color Computer installation.

---Marty Goodman